Authors' responses to review comments are in ***red, bold, italics.***

Anonymous Referee #3

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We thank Reviewer 3 for the many insightful comments and suggestions.

General Comments:

1. The paper presents two interesting case studies from Amazon countries, where the FCM approach was adopted to understand the perceptions of local actors about their environmental context. As result, different networks and scenarios were present to debate how local actor from each region could reacts to the sustainability and development challenges.

2. In the introduction section, the narrative conducts the reader to the importance of two groups of stakeholders in Bolivian (Guarayos indigenous communities) and Brazilian Amazon (Tapajós riverine communities). An important point in this kind of modeling approach is the choice of stakeholders to represent the multiplicity of actors and perceptions for tackling the problem analyzed. Considering this, some questions come up:
- Do the authors think that the riverine and indigenous communities were well represented in the groups of stakeholders that participated in the workshop?
Good point. Yes, riverine and indigenous communities were well represented in the workshops. See Table 1. In both cases (Guarayos in Bolivia and Tapajós in Brazil), key representatives of the indigenous communities (with the ability to make and to influence decisions) attended the workshops. E.g., in Guarayos (Bolivia), several representatives of the Organisation Centre of Guarayo Native People (COPNAG), which is the most powerful and influential indigenous association in the region attended the workshops. Similarly, in Tapajós (Brazil), the representative of all indigenous communities of the Flona (who lived in Communidade do Maguari) attended the workshop, together with other indigenous community heads. Indigenous communities were reached by the local teams of the ROBIN project (IBIF in Bolivia, and EMBRAPA in Brazil; researchers of both teams are co-authors of the paper), which are great connoisseurs in the area and have long experience working with indigenous communities.
- Do the cognitive maps represent the vision of these groups?
Yes. The maps include the vision of these groups. In fact, in Brazil, the representative of all indigenous communities of the Flona presented the FCM obtained in the plenary

3. The description of the study area is long. The authors could be more focused on providing elements to support the research questions and the results (especially, the scenarios). For example, the social, cultural and political contexts experienced by stakeholders that can influence the networks structures or different responses to scenarios.
Agree, thank you. Following your suggestion (and other similar from other reviewers) we have deleted irrelevant information (e.g., mean annual temperatures or precipitation; we have been told that it is sufficient to know the type of climate for the purpose of the article) and focused this section on the description of the socio-economic, cultural, and political context. In addition, as suggested by one of the reviewers, the description of the case study has been now

separated from the methodology section. We have added a new point '2 Description of the study area' that goes after '1 Introduction' and before '3 Methodology'.

4. Regarding the description of the study area, details of temperature, precipitation and vegetation are not relevant in this section, unless they are used in the design of climate change scenarios (that would be interesting).

We have deleted this information. See previous comment (point 3).

5. The section 2 should focus a little more on describing the workshops. Given that the stakeholder participants within each case study seem to be diverse and present even contrasting view on development and conservation, some issues need to be clarified, such as:

Thank you very much for noticing this. We have made some changes following your suggestions (see below)

- How the authors selected the stakeholders groups?

Agree. We have clarified this. See page 5, lines 25-31 and Table 1

How conducted the process of identifying the components to be included in the model? How do the participants identify the degree of influence between components (high, medium, etc.)?

Agree. This has been explained in more detail in the manuscript. See page 6, lines 1-10

What were the most important components mentioned in the workshops?

The most important components are those reflected in the FCMs, and particularly those with the highest page rank (see Figures 4 and 5).

- It is unclear how component values were obtained during the workshops (were individual or group responses?).

Agree. They were group responses. This is now specified on page 6, lines 1-2 'the FCM developed represented stakeholder group knowledge' (Ösezmi and Ösezmi, 2004), and on page 6 line 11, FCMs are 'group maps'.

How have the authors converted the cognitive maps in the adjacent matrix? I mean, how the strength of the interactions among components (the weighted values) was defined?

The strength of the interactions among components was defined by the stakeholders in the workshops as described on page 6, lines 1-10

How the contrasting view of the problem was converted in a single value of influence? I suggest the authors to provide the ranges of model parameters/variables presented during the workshops to show contrasting views.

The FCMs are group maps and therefore 'agreed' or 'consensual' maps developed during the workshops. Discussions between stakeholders were guided by a facilitator, who helped to reach consensus. These types of exercises are not meant to identify contrasting views, to do so it is better to develop individual FCMs or other methodologies. Furthermore, the objective of the paper was not to dig on individual/contrasting views, but to have a clear picture of the common vision of the present in two communities (Guarayos and Tapajos) from different countries (Bolivia and Brazil), living on the edge of the agricultural frontier and confronting similar problems.

6. Scenario section (2.4) is not clear. The authors could provide more details about the scenario conception and the stakeholders' contribution.

Agree. Thank you. We have made some changes following your suggestions (see below)

- How were climate change identified by stakeholders (changes in temperature, extreme climate events, precipitation, river level, floods, forest fires, soil erosion, etc.) and how were they translated it to the model?

As is common with the Fuzzy Cognitive Mapping method, similar components were grouped together. The stakeholders in both Brazil and Bolivia mentioned an array or terms (e.g. increasing drought, reduced rains, increasing floods, weather instability), but they decided during the workshops to use the word 'climate change' to catch all terms. Further, in follow up meetings (Varela-Ortega et al., 2014) stakeholders validated this combination as being accurate to the current situation.

Following the suggestion of one of the reviewers, we have removed the climate change scenario as being an independent scenario and just defined it as an additional element for the scenarios. Also, following your comment, we have now provided a more extended explanation of the translation of these scenarios into the model (Pg 8: lines 7-18).

The climate change scenarios are the same for the two study sites?

Yes

What climate changes were considered to be impacted by deforestation?

Increasing drought, reduced rains, increasing floods, weather instability

- Conservation strategies were resumed in one strategy in the Tapajós case study (Environmental Monitoring). It is not clear if the scenario components were defined in the workshop by the stakeholders or by the authors. Anyway, I see as a problem reducing conservation strategies in a unique and passive action of monitoring. By doing this, conservation strategies may seem to have low impact to achieve desired changes, in comparison with the governance and techno-social reform.

The scenarios were first proposed by the authors, based on literature review, and then further defined by the stakeholders taking into account the limited number of factors included in the FCMs. We agree that the conservation scenario in the Tapajós case study may seem to be too reductionist, but stakeholders identified improved monitoring as the key environmental aspect to achieve a successful conservationist future. Stakeholders think that many conservation policies have already been developed and put in place, but their effectiveness has been limited due to insufficient monitoring and enforcement. Also, stakeholders think that a lot more remains to be done for improving institutional and governance systems, to protect traditional communities, support technical training, etc. Many aspects could be improved in this regard that could have positive impacts in the region. This is why the governance and techno-social scenario include changes in several components and the conservation scenario only in one.

7. The authors show in figure 2 that FCM was validated in the second workshop. How the validation procedure was carried out? Can the same participants in the first workshop validate the FCM they created themselves?

The people who participated in the second workshop are not exactly the same as those who participated in the first workshop. We were very careful to count with the same group of stakeholder, but the key representatives varied in some cases (due to agenda issues or changes in governmental bodies). Thus, the FCMs were validated by the same groups of stakeholders, not exactly by the same participants.
In the second workshop, the validation was performed by showing the stakeholders the processed FCM, including the dynamic analysis, and discussing with them the results. In both cases, Guarayos in Bolivia and Tapajos in Brazil, the main components of the FCMs remained unchanged, but stakeholders decided to change (increase/decrease) the strength of some links among components (e.g., in Guarayos, stakeholders decided to increase the weight given to the links 'illegal mining → soil erosion'; 'illegal mining → contamination').

8. In the Dynamic analysis of FCM (3.2), some interesting results could be presented in respect to the model dynamics during the calculation to achieve the baseline situation. Does the system's identity remain the same after steady state analyses is conducted?
Yes, the systems' identity remains the same. The steady state analysis considers the current situation of all variables. It is used to measure how a variable is changing (increasing, reducing, or stable based upon the value) in the system and you can also compare across variables (i.e whether deforestation is increasing, whilst forest law implementation is reducing) within the system. However, the system remains the same as the weighting applied to each variable is identical; the 'identity' would only change with the application of the scenarios, where the current situation of the system is altered. The iterations (calculation) of the model dynamics are irrelevant, the final result is what it is important and it is shown in Figures 6 and 7.

- Do the authors think that there is a relation between FCM complexity and the diversity of indigenous and riverine communities in the group of stakeholders?
No, we think that there is not such a relation. Key representatives transmitted a common voice for the indigenous and riverine communities. This is quite frequent; they used to have a common voice to make theirselves heard.

Specific comments:

Page 2: Include more recent citations in introduction.
Agree. Done

Page 5, Line 6: 'dense moist and wet forest types'. I suggest you include a classification system for the Amazon vegetation to describe the forest types.
Agree, defined now as dense terra firme (upland) tropical moist forest

Page 5, lines 7-9: I suggest you mention the decree n_ 73.684, February 19 of 1974.
Agree, included

Page 5, Line 10: Cite data source (reference) in respect to the number of 'ribeirinhos' and 16 communities mostly along Tapajós river.
Following the suggestion of another reviewer, we have deleted the number of communities and further specified the ethnical background of this riberirinhos

Page 6, Lines 20 – 25: How were focus groups defined?
This has now been detailed in Pg. 5, lines 26-31.

Page 7: Last paragraph: I suggest to present the adjacent matrix in the supplementary material.
We have tried to include the adjacency matrix as Tables in the Supplementary material, but it has been impossible, they are too big (29 lines x 29 columns in Guarayos, 32 lines x 32 columns in Tapajós). They are illegible

Page 9: How much components were included in the model by the workshop participants?
This is specified in Table 4 (second line), in Guarayos 29, in Tapajós 32